Physics 152 Fall 2023 Final Exam Notes
Final: Monday, December 18, 2023
12–3 p.m. Hugel 142
This is our usual classroom!

Our final class, Friday, December 8, 2023, will devoted to review and to answering questions.

Logistics:

- The final will be designed to be completed in a 2-hour time period, but you may take the full 3-hour period if you wish.

- This will be an closed-book exam, very similar in style and format to our previous hour tests. You will be provided with an equation sheet similar to those from previous hour tests. A copy is available on the course website.

- All problems *must* begin with either a fundamental principle or with an equation from the equation sheet. Simply getting the correct final answer is not sufficient. You must also display correct reasoning for getting that answer. If any question is unclear, please ask immediately. Be sure to show your work **clearly**. Partial credit may be given for work *if* it can be understood.

Topics:

The final exam will be cumulative, incorporating topics covered throughout the semester. Some problems might include qualitative as well as quantitative questions. Some problems may focus on a single topic or chapter, while others may include topics from several different chapters. Consult the syllabus for the specific list of topics.

Problems will typically focus on the underlying fundamental physics rather than obscure applications or complex mathematical manipulations.

The following general areas may be covered:

Ch. 15 & 16	Waves (but only as background)
Ch. 21	Electric Forces and Fields
Ch. 22	Gauss's Law
Ch. 23	Electric Potential and Potential Energy
Ch. 24	Capacitance
Ch. 25 & 26	DC Circuits
Ch. 27	Magnetic Forces and Fields
Ch. 28	Sources of Magnetic Field
Ch. 29 & 30	Electromagnetic Induction
Ch. 32	Electromagnetic Waves
Ch. 33	Light
Ch. 35	Interference
Ch. 36	Diffraction

Omissions: The following topics originally on the syllabus will not be on the final:

Section 30:6	L-R-C Circuits
Section 33:4	Dispersion
Section 33:6	Scattering
Chapter 34	Geometric Optics
Section 35:4	Thin Films

Lab-Inspired Questions:

There may be lab-inspired questions on the final. For example, there may be questions which are similar to physical situations you encountered in lab. There could also be problems in which you are presented with graphical information (similar to what you have generated in lab) and asked to use the graph to solve a problem. For example, you might be given a graph for an experiment and be expected to use the slope and intercept to determine some relevant physical quantity.

You will not be responsible for calculating or propagating uncertainties, though I do hope you find those topics useful in your future endeavors. You should know how to *interpret* uncertainties such as you obtained in fits in lab. For example, if you predict $a = 1.50$ and you experimentally measure $a = 1.47 \pm 0.05$, you should know how to draw conclusions based on those numbers.

Review Strategies

- Review the equation sheet carefully so that you know what the symbols mean and when each equation applies. It is important to understand what the in-

dividual symbols mean, but it is also important to understand the broader context for the equations so you know when they do or do not apply, and how to combine them in a particular situation.

- Do not attempt to memorize specific examples. Instead, be sure you understand the basic physical principles applied and the reasoning behind their use.

- Read equations as sentences telling a story, not just as jumbles of symbols.

- Focus on being able to explain a logical chain of reasoning.

- Review homework problems—particularly pen & paper problems.

- Look at related textbook problems. For example, if we did problem 38, look at problems 37 & 39. They are usually similar. Answers to odd-numbered problems are in the back of the book.

- Check out the "Guided Practice" section at the end of each chapter. The "Bridging Problems" are usually more complex than you will encounter on the exam, but they are good practice for thinking about how to approach complex problems.

- If you want to practice finding a way to start a problem, try reading and setting up lots of other problems from the back of the text. You don't need to work through all the arithmetic on every problem, but reading a wide variety of problems is a good way to see many different ways in which similar physics principles can show up. The problems labelled "CP" are intended to be cummulative problems, which incorporate material from multiple chapters.

- Make good use of the Study Area on MasteringPhysics. For example, you can find many worked examples there. You can also find extensjve class recordings.

  - The "Conceptual Videos" section of the MasteringPhysics Study area includes a number of short animations illustrating various concepts. These are not indexed in the "Study by Chapter" section, so it is worth browsing through this list of videos.

Problem-Solving Strategies

- Practice solving problems under test-like conditions. Try using just the equation sheet.

- Read the whole problem carefully.

- Make a big sketch with clear labels. Use those labels in your equations. This helps make sure your intent is clear, both to yourself and to the grader.

- Try expressing in words what is happening—what is the story?

- Do not memorize specialized equations. Start each problem with a general principle or an equation from the equation sheet. *If you start your solution with a specialized equation that is not on the equation sheet, you may lose substantial credit.* Then, if numerical values are needed, substitute them for the appropriate symbols. This shows that you know what the relevant physics is and what the symbols mean.

- Pay attention to units. They can sometimes be a clue about how to approach a problem. (*e.g.* note that Intensity has units of W/m^2, while power has units of W.)

- Present your work clearly and carefully so that it can be read and understood.

- Avoid round-off errors. Your final answer should normally be within 1% of the correct answer. Keep additional digits in your intermediate calculations.

- Reread any written explanations to make sure they say what you meant to say.

- Don't panic. You should have plenty of time.

- Get a good night's sleep!